318i

## Northeast Interim Standard

# Dead Poultry Composting Facility (No.)

## Definition

A facility for the composting of the normal daily accumulation of dead birds from a poultry operation.

## Scope

This standard establishes the minimum acceptable requirements for design, construction, operation and maintenance of a composting facility. It does not apply to a facility with the capacity to accommodate catastrophic losses associated with epidemics, excessively high temperatures, collapse of buildings, etc. or poultry processing wastes.

## Purpose

To biologically treat poultry carcasses by composting and to protect the environment by stabilizing nutrients, destroying pathogens and producing an odorless, humus-like material which is useful as a fertilizer substitute and a soil amendment.

## Condition Where Practice Applies

This practice applies where: (1) Composting is needed to treat and manage waste organic material; (2) Adequate area is available for installation; (3) Foundation materials are sufficiently stable; (4) Sufficient cropland is available for proper compost utilization; (5) State and local laws allow composting of poultry carcasses.

## Planning Considerations

LOCATION: In locating composting facilities consideration needs to be given to each of the following:

**On-farm traffic patterns and the location of application site(s).** Locate the composting facility in a convenient area close to the source of dead birds and manure to minimize labor and reduce handling.

**Wind direction and the proximity of neighbors.** Improperly managed compost facilities may generate offensive odors until corrective measures are taken. In addition, land application of improperly composted material may generate odors.

**Topography.** Avoid locating composting facilities on slopes greater than 5 percent and in drainage ways, flood plains, areas of high water table or low areas that concentrate surface runoff.

**Well heads.** When possible,locate the composting facility down-gradient and at an appropriate distance away from well heads.

**Foundation materials and soils.** Locate the compost facility on stable foundation materials.

SIZING: In sizing composting facilities, consideration needs to be given to each of the following:

**Equipment.** Determination of compost facility dimensions should consider the size of existing and future loading, mixing and hauling equipment.

**Future operation size.** Landowner future production objectives should be assessed when sizing the compost facility.

OPERATION: Consideration needs to be given to the following operation aspects of the compost facility:

**Management.** Composting operations require close management. Management capabilities of the operator and availability of labor should be assessed.

**Carbon Source.** A dependable and economic source of carbonaceous material must be available for use as a compost mix amendment. This material should have a high carbon content along with a carbon to nitrogen (C:N) ratio greater than 30. Woodchips, sawdust, straw, leaves are examples of carbon sources.

**Bulking Materials.** A dependable and economic source of bulking materials may be needed. Bulking agents provide structure and porosity to the compost mix and may also be a source of carbon. Woodchips, straw and bark can be used as bulking agents.

**Equipment.** Equipment should be available for initial mixing, turning and hauling composted material and carbonaceous material. Long stem thermometers should be available for managing the composting material.

**ECONOMICS:** Consideration needs to be given to the following economic factors:

**Utilization.** Economic benefit of using the composted material as a fertilizer substitute and the benefits associated with improvement of soil tilth.

**Capital and operating costs.** The cost of installing and managing the compost facility including hauling, mixing, turning, monitoring and equipment costs should be evaluated.

**ENVIRONMENTAL EFFECTS:** Consideration needs to be given to each of the following environmental effects:

Decreased nitrate leaching and volatilization resulting from the application of compost versus raw manure.

Decreased odor resulting from the application of dead bird compost versus manure and improper disposal of dead birds.

Reduced pathogens in surface runoff resulting from the application of compost versus raw manure and improper disposal of dead birds.

## Design Criteria

The design and operation of dead poultry composting shall comply with all federal, state and local laws, rules and regulations. The poultry producer is responsible for securing and maintaining all necessary permits to install and operate the compost facility.

**Rainfall and runoff exclusion.** The compost facilities shall be roofed and guttered to exclude rain water and roof runoff from the compost mixture. Surface water runoff shall be diverted away from the compost facility. The compost facility should be located to prevent inundation from a 25 year frequency flood event. In the event that this is not feasible, the facility shall be provided with clear access and protected from a 25 year frequency flood event.

**Volume and Size.** The dead bird composting facility shall be designed as a two-stage unit. The primary stage or digester shall be contained in separate bin(s). The secondary stage or digester may consist of separate bins or it may consist of one bin of the size equivalent to the sum of the individual bins.

The volume of each stage in the composting unit shall be based on the mortality rate during the end of the lifecycle. Each stage of the composting unit shall provide, at a minimum, a volume equal to the following:

$$Vol = B \times (M / T) \times WB \times 2.5 / 100$$

where: Vol = Volume in cubic feet for each stage
B = Number of birds in poultry operation
M = Mortality expressed as a percent loss over the life of the flock
T = Flock life in days
WB = Average market weight of bird
2.5 = Rule of thumb, Volume in cubic feet for each stage of composter per pound of dead bird at maturity. Units = cu-ft/(lb/day)

The planned width across the front of a composting bin shall be sized to accommodate the loading and mixing equipment and shall be no less than five feet. The height of a composting bin shall be no greater than six feet and no less than one half the width. The distance from the front of a composting bin to the back shall be no less than half the width and should be no more than the width.

The number of bins in stage one is equal to the volume required divided by the planned volume of each bin.

$$\text{No. of Bins} = \frac{\text{Volume Required}}{\text{Volume of a bin}}$$

The number of bins necessary shall be calculated to the nearest whole number. The second stage may consist of like bins or one bin or alley of equal or greater volume than stage one.

**Materials and Structure Design.** Materials and structural design of the composting facility shall

conform to SCS Standard 313, Waste Storage Structure.

A concrete pad should be installed if heavy equipment is used in operation of compost facility. A bituminous pad may used, but the pad should be insulated from the composting material wih a thick layer of manure or other carbonaceaous material. High temperatures from the compost process may soften and damage an uninsulated bituminous pad.

If a concrete pad or a sealed bituminous pad is not used, an impervious liner is required if the soil permeability is greater than 6 inches/hour or the depth to the seasonal high water table is less than 36 inches or the depth to bedrock is less than 20 inches.

## Operation and Maintenance

**Operation and Maintenance Plan.** The landowner/operator shall be provided with written operation and maintenance instruction for the composting component of the waste management system. As a minimum, the instruction shall detail the mix(s) to be composted, moisture content and temperatures to be achieved, schedules for aerating/turning the material and the end use(s) of the finished compost.

**Compost Mix.** The loading or initial mixing operation shall follow a prescribed mix and procedure. State or local agency mix and loading requirements shall be followed if required. A prescribed mix and loading procedure may be available through Cooperative Extension Service, Soil Conservation Service or other state and local agencies.

If a state or local recommendation for a mix is unavailable or inappropriate then a prescribed mix or recipe shall be designed to result in aerobic biological decay of the compost mix, with temperatures exceeding 130°F. If local information is not available, the mix or recipe in Table 1 is recommended for composting of broilers or birds of like size. It should not be used for other sizes of birds or carbon sources.

**Table 1**

| Ingredient | Volumes (Parts) | Weights (Parts) |
|---|---|---|
| Straw | 1 | 0.1 |
| Broiler | 1 | 1 |
| Manure | 2.0 | 1.5 |
| Water* | .5 | .75 |

* More or less water may be necessary depending on the moisture content of the straw and manure.

The carbon to nitrogen ratio of the initial combination of dead birds, manure, carbon source and bulking agents should be within the range of 13 - 14 and shall be no greater than 30 and no less than 12.

The right amount of water is critical to the success of the composting process. Enough water should be added to ensure that the mixture is moist but not saturated. The moisture content of the compost mix should be maintained in the range of 45-55 percent by weight but shall not be less than 40 percent or greater than 60 percent.

The porosity of the initial compost mix shall be sufficient to maintain aerobic conditions throughout the compost process with minimal maintenance. This is normally accomplished by layering dead birds, manure and straw.

**Loading the primary composter.** If local information on loading the primary compost bins is not available or required the following is recommended:

1. One foot of dry manure should be placed on the floor of the bin to soak up excess moisture. This is not a part of the recipe in Table 1.

2. A 6 inch layer of loose straw is placed on top of the manure to aid aeration under the carcasses.

3. A uniform layer of carcasses is added on top of the straw with 6 to 8 inches of manure added next to the side walls to keep carcasses away from the sidewalls.

4. A minimum of 4 inches of manure is immediately added to cover the top of the carcasses.

5. Water is sprinkled uniformly on top of the manure as needed or prescribed.

6. The second and each subsequent combination of straw, carcasses and manure (batch) starts with a layer of straw, then a layer of carcasses and then a layer of manure added in proportion required in the prescribed mix. Water should be sprinkled on each batch as needed or prescribe.

7. When the loading of the primary composting bin is complete, add an additional 4 inch cap of manure to the top of the compost mix. This 4 inches is in addition to the manure that was added to the top of the last batch. This 4 inch cap of manure is not included in the Table 1 design mix.

Figure 1 is an illustration of the recommended layering for dead bird composting:

**Aeration.** Aeration shall be provided during the composting process by unloading the first stage bins and loading the second stage bin(s), alley or pad. The contents of primary composter should be unloaded and transferred to the secondary composter as peak temperatures in the primary composter begin to decline after 5 to 7 days, optimally at 10 days.

**Temperature.** Temperatures in the primary and secondary stages shall be monitored and recorded on a daily basis. A temperature probe of sufficient length and with protective covering should be used to monitor the internal compost temperature. If internal compost temperatures exceed 160°F measures shall be taken to reduce the temperature.

The compost shall be removed from the bin, spread on the ground to a depth not to exceed six inches in an area away from buildings, and, if necessary,

**Recommended Layering for Dead Bird Composting**

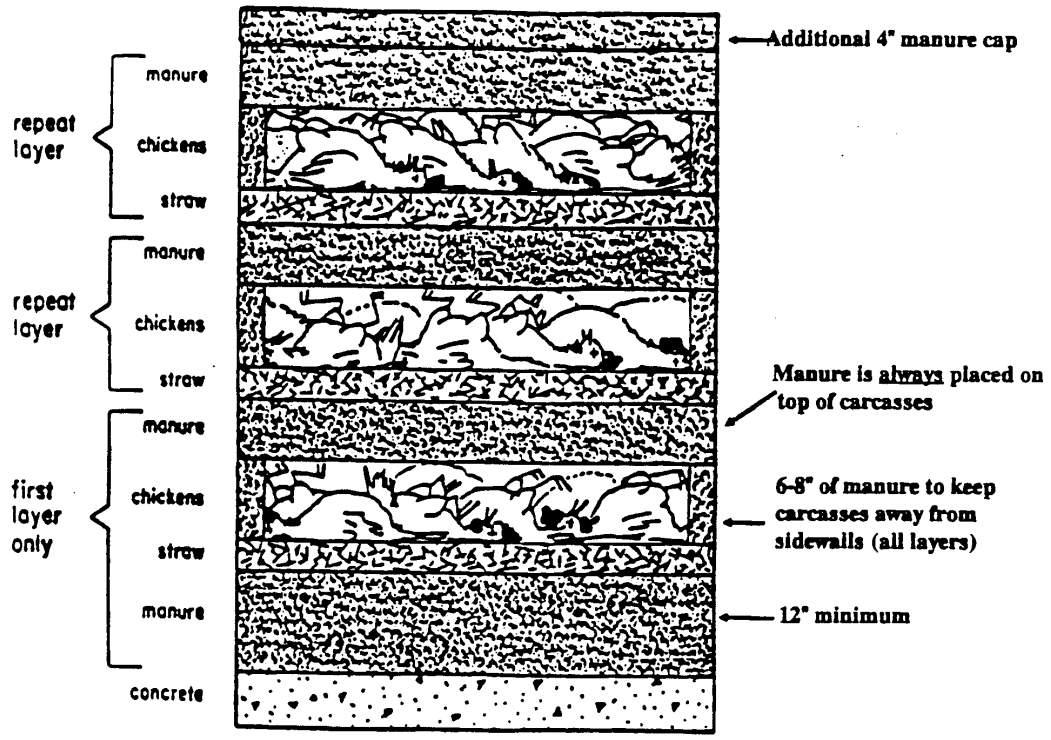


**Figure 1**

saturated with water to prevent spontaneous combustion.

**Final disposition.** The compost removed from the secondary composter after approximately 10 days is ready for land application or other use. Best results will be achieved with storage or "resting" in a covered area for 30 days before land application. Storage depth shall not exceed 7 feet to reduce the potential for spontaneous combustion. In addition, it shall not come into contact with any manure stored in the same facility.

**Testing.** The landowner/operator should, on a periodic basis, test the nutrient content of the finished compost and make any necessary adjustments in the farmsteads' nutrient management plan.

**Land application.** The land application of the compost shall be in conformance with a Practice Code 680, Nutrient Management, Practice Code 633, Waste Utilization and shall be documented in the Waste Management System Plan and/or Nutrient Management Plan. If internal temperatures in the first and second stages of the compost process fail to achieve 130°F, the compost shall be incorporated during or immediately after land application or reused as a compost carbon source.

**Inspection.** At a minimum the compost facility shall be inspected at least twice yearly when the facility is empty. Replace any broken or badly worn wooden parts or hardware. Patch concrete floors and curbs as necessary to assure water tightness, and repair gutter and roof structures as needed.

## References

1. Agricultural Waste Management Field Handbook, USDA, Soil Conservation Service, Revised 1991.

2. Environmental Engineering Note No. 3, USDA Soil Conservation Service, April 1991.

3. Livestock Waste Facilities Handbook, Midwest Plan Service - 18, March 1985.

4. Manure Management Handbook, Maryland State Soil Conservation Committee, August 1989.

5. Murphy, Dennis, "Composting of Dead Birds," University of Maryland, 1988.

6. . Palmer, Daniel, "Dead Poultry Disposal," University of Delaware, Cooperative Extension Service.

7. South National Technical Center Bulletins S210-0-5 and S210-0-5.

8. Alabama Interim Standard on Dead Bird Composting, December 1989.

9. Guide for Dead Poultry Composting, Virginia Engineering Note No. 1, USDA Soil Conservation Service, November 8, 1990.

10. Dead Poultry Composting, Auburn University, Cooperative Extension Service Circular AN-558.

## Northeast Interim Specifications

# Dead Poultry Composting Facility (No.)

The work shall consist of construction of the dead poultry composting facility at the location and to the dimensions shown on the plan and approved drawings. The facility shall be part of a Waste Management System (312) plan developed for the farm or enterprise.

**Foundation Preparation.** All trees, brush, stumps, stones, fence rows and other obstructions shall be removed from the building area and disposed of in specified disposal areas in a manner that will not cause pollution to ground or surface water or interfere with drainage patterns or farming operations. Sod and topsoil shall be removed from the building area and stockpiled. Any soft or saturated material shall be removed and disposed of as directed by site conditions.

**Placement and Compaction.** The earth material used to bring the foundation for the structure to grade shall be a compacted base of SC, SM, GC, or GM and contain greater than 12 percent fines. Fill material shall be placed and spread in lifts of 6 inches and compacted by at least one pass of the equipment used for grading the site. The fill material should be moist, not dry or saturated, to facilitate compaction.

**Concrete.** Concrete materials, reinforcing schedule and construction methods shall be as specified in the drawings.

**Timber Fabrication.** Structural timber and lumber shall conform to the sizes and lengths shown on the drawings. All framing shall be true and exact. Timber and lumber shall be accurately cut and assembled to a close fit and shall have even bearing over the entire contact surfaces. No open or shimmed joints will be accepted.
Unless otherwise specified, surfacing, cutting, and boring of timber and lumber shall be done before treatment. If cutting of treated lumber is authorized, all cuts and abrasions shall be carefully trimmed and then coated with at least three (3) coats of a wood preservative.

**Establishment.** To establish this practice, the operator needs to follow these steps:

1. Determine the waste management system components necessary to manage all wastes and prevent degradation of air, water, soil, plant and animal resources.

2. Using the components selected, develop a waste management plan PRIOR to installing any components, Components should be in order of priority and be shown in an installation schedule.

3. Plan, design, and install the practices.

4. Follow local, state and federal regulations pertaining to waste management and utilization.

**Other Plans and Specifications.** Plans and additional specifications for dead poultry composting facility shall be in keeping with this and other referenced standards. They shall describe the requirements for applying the practice to achieve its intended purposes, and shall include a written operation and maintenance plan.

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# WORKSHEET TO DETERMINE SIZE OF DEAD BIRD COMPOSTER

B = No. of birds on farm = _____

M = Anticipated mortality for flock, as decimal (i.e., broilers: 5 percent loss for flock or 0.05 as decimal).

T = Life of flock (i.e., broilers: 50 days).

$W_B$ = Weight of birds near maturity (use 4.2 lbs for broilers)

$W_T$ = Weight of daily loss on day 50

= B X [ (M / T) X $W_B$ ]

=_____ X [ (_____/_____) X _____] = _____lbs/day

Allow 2.5 cf composter volume per lb dead wgt in each stage:

$V_1 = V_2$ = 2.5 X $W_T$ = Volume in each stage

Stage 1 volume = $V_1$ = 2.5 X _____ = _____ cf

Number of composter bins:

h = height of bin (4-5 ft)

$y_1$ = depth of bin (5 ft)

$y_2$ = width (front) of bin (8-10 ft)

$V_B$ = individual bin volume = h X $y_1$ X $y_2$

= _____ X _____ X _____ = _____ cf

No. of bins = $(V_1)/(V_B)$ = _____/_____ = _____

Round to nearest whole number: _____ bins in Stg. 1

Stage 2: provide an equal number of bins as for Stg 1 or size to accommodate volume in one large bin, 8-10 ft wide.

Stage 2: _____